## CLAIMS

What is claimed is:

1. A trap device for removing at least one undesirable constituent from a gaseous process stream passing through a vacuum system comprising:
a chamber configured to operate at a pressure below atmospheric pressure; and
at least one substance delivery element associated with the chamber and configured to deliver at least one substance to an interior of the chamber.

2. The trap device of claim 1, wherein the at least one substance delivery element is configured to prevent formation of deposits comprising the at least one undesirable constituent thereon.

3. The trap device of claim 2, wherein the at least one substance delivery element is configured for modification of a temperature of at least a portion thereof.

4. The trap device of claim 1, wherein the at least one substance delivery element is configured to remove or clean deposits comprising the at least one undesirable constituent therefrom.

5. The trap device of claim 4, wherein the at least one substance delivery element is configured for modification of a temperature of at least a portion thereof.

6. The trap device of claim 1, wherein the at least one substance delivery element is configured to deliver at least one substance comprising water or ammonia.

7. The trap device of claim 1, wherein the at least one substance delivery element is configured to deliver the at least one substance to cause formation of a deposit comprising the at least one undesirable constituent within the interior of the chamber.

8. The trap device of claim 1, wherein the at least one substance delivery element is configured to deliver the at least one substance to cause formation of at least one precipitate comprising the at least one undesirable constituent within the interior of the chamber.

9. The trap device of claim 8, wherein the at least one substance is formulated to cause the formation of at least one precipitate comprising at least one of titanium, titanium dioxide, hydrochloric acid, water, and ammonia chloride.

10. The trap device of claim 1, wherein the at least one substance delivery element is configured to thermally facilitate formation of a deposit comprising the at least one undesirable constituent within the interior of the chamber.

11. The trap device of claim 10, wherein the at least one substance delivery element is configured to thermally facilitate formation of a deposit comprising the at least one undesirable constituent within the trap device by removing heat from a gas within the interior of the chamber.

12. The trap device of claim 8, wherein the at least one substance delivery element is configured to prevent formation thereon or facilitate removal therefrom of deposits comprising the at least one undesirable constituent thereon.

13. The trap device of claim 12, wherein the at least one substance delivery element is configured for modification of a temperature of at least a portion thereof.

14. The trap device of claim 1, wherein the at least one substance delivery element is configured for modification of a temperature of at least a portion thereof.

15. The trap device of claim 12, wherein the at least one substance delivery element is configured to facilitate cleaning thereof.

16. The trap device of claim 1, wherein the at least one substance delivery element includes at least one nozzle or atomizer for delivery of the at least one substance.

17. The trap device of claim 1, further comprising a control device for controlling a rate at which the at least one substance is delivered by the at least one substance delivery element.

18. The trap device of claim 17, wherein the control device comprises at least one valve.

19. The trap device of claim 1, further comprising at least one measurement device for measuring an amount of a deposit comprising the at least one undesirable constituent within the interior of the chamber.

20. The trap device of claim 1, wherein the at least one substance delivery element comprises a plurality of substance delivery elements.

21. The trap device of claim 20, wherein each substance delivery element of the plurality is arranged to deliver the at least one substance to a different location within the interior of the chamber.

22. The trap device of claim 1, wherein the at least one substance delivery element comprises a plurality of substance delivery elements and a first substance delivery element of the plurality is configured to deliver a first substance and a second substance delivery element of the plurality is configured to deliver a second, different substance to the interior of the chamber.

23. The trap device of claim 1, wherein the at least one substance delivery element is configured to deliver more than one substance to the interior of the chamber.

24. The trap device of claim 1, further comprising at least one measurement device for measuring at least one characteristic of a deposit comprising the at least one undesirable constituent within the interior of the chamber.

25. The trap device of claim 24, wherein the at least one characteristic of the deposit comprises thickness of the deposit.

26. The trap device of claim 24, wherein the at least one substance delivery element is configured to deliver a first substance within the chamber of the trap device according to a first range of the at least one characteristic of the deposit measured by the at least one measurement device and a second substance according to a second range of the at least one characteristic of the deposit measured by the at least one measurement device.

27. The trap device of claim 1, wherein the at least one substance delivery element is configured to at least partially preserve a substantially continuous path through deposits comprising the at least one undesirable constituent through the interior of the chamber.

28. The trap device of claim 1, wherein the at least one substance delivery element is configured for inhibiting formation of deposits comprising the at least one undesirable constituent along a substantially continuous path through the interior of the chamber.

29. A trap device for removing at least one undesirable constituent from a gaseous process stream passing through a vacuum system comprising:
a chamber configured to operate at a pressure below atmospheric pressure; and
at least one deposit interaction element for distributing or redistributing deposits comprising the at least one undesirable constituent formed within the chamber of the trap device.

30. The trap device of claim 29, wherein the at least one deposit interaction element is configured to cause at least a portion of the deposits to form a liquid or gas state within the chamber of the trap device.

31. The trap device of claim 29, wherein the at least one deposit interaction element is configured to cause at least a portion of the deposits to form a gaseous state within the chamber of the trap device.

32. The trap device of claim 29, wherein the at least one deposit interaction element is configured to facilitate formation of a deposit in at least one region of the chamber.

33. The trap device of claim 29, wherein the at least one deposit interaction element is configured to at least partially remove a deposit from at least a portion of the chamber.

34. The trap device of claim 29, wherein the at least one deposit interaction element is configured to at least partially preserve a substantially continuous path through the chamber of the trap device.

35. The trap device of claim 29, wherein the at least one deposit interaction element is configured for inhibiting formation of or removing deposits from along a substantially continuous path through the chamber of the trap device.

36. The trap device of claim 35, wherein the at least one deposit interaction element comprises a laser beam-generating device for generating a laser beam positioned and sized for inhibiting formation of deposits or removing deposits from along the substantially continuous path through the chamber of the trap device.

37. The trap device of claim 36, further comprising at least one of a mirror, a lens, and a beam splitter for communicating the laser beam along the substantially continuous path through the chamber of the trap device.

38. The trap device of claim 29, wherein the at least one deposit interaction element comprises at least one thermal element for modifying a temperature of at least a portion of the chamber to influence formation of deposits therewithin.

39. The trap device of claim 38, wherein the at least one thermal element comprises at least one of a heat-generating element, a cooling element and a heat transfer element.

40. The trap device of claim 38, wherein the at least one thermal element comprises a thermoelectric device.

41. The trap device of claim 38, further comprising a measurement device configured to measure and communicate a signal indicating at least one of a temperature of the at least one thermal element and a characteristic of a deposit within the chamber.

42. The trap device of claim 41, further comprising a control device in communication with the measurement device signal configured to alter a response of the at least one thermal element in relation thereto.

43. The trap device of claim 42, wherein the at least one thermal element comprises a plurality of thermal elements.

44. The trap device of claim 43, wherein each of the plurality of thermal elements is configured to modify a temperature of an adjacent portion of the chamber independently of at least one other thermal element of the plurality.

45. The trap device of claim 29, wherein the at least one deposit interaction element comprises at least one delivery port for delivering at least one substance within the chamber.

46. The trap device of claim 45, wherein the at least one delivery port is configured for modification of a temperature thereof.

47. The trap device of claim 45, wherein the at least one delivery port is configured to facilitate removal of deposits therefrom.

48. The trap device of claim 45, wherein the at least one delivery port is configured to deliver at least one substance comprising water or ammonia.

49. The trap device of claim 45, wherein the at least one delivery port is configured to cause formation of a deposit within the chamber.

50. The trap device of claim 45, wherein the at least one delivery port is configured to deliver at least one substance to cause formation of at least one precipitate within the chamber.

51. The trap device of claim 50, wherein the at least one precipitate includes at least one of titanium, titanium dioxide, hydrochloric acid, water and ammonium chloride.

52. The trap device of claim 45, wherein the at least one delivery port is configured to thermally facilitate formation of a deposit within the chamber.

53. The trap device of claim 45, wherein the at least one delivery port includes at least one nozzle or atomizer.

54. The trap device of claim 45, further comprising a control device for controlling a rate at which the at least one substance is delivered via the at least one delivery port.

55. The trap device of claim 54, wherein the control device comprises at least one valve.

56. The trap device of claim 45, further comprising a measurement device configured to measure and communicate a signal indicating at least one of a temperature within the chamber and at least one characteristic of a deposit within the chamber.

57. The trap device of claim 56, further comprising a control device in communication with the measurement device signal configured to alter the delivery of the at least one substance in response thereto.

58. The trap device of claim 56, wherein the at least one characteristic of the deposit is a thickness of the deposit.

59. The trap device of claim 45, wherein the at least one delivery port is configured to deliver more than one substance within the chamber.

60. The trap device of claim 45, wherein the at least one delivery port is configured to at least partially preserve a substantially continuous path through the deposits within the chamber.

61. The trap device of claim 45, wherein the at least one delivery port is configured for inhibiting formation of deposits or removing deposits from along a substantially continuous path through the chamber.

62. The trap device of claim 29, wherein the at least one deposit interaction element is configured to physically interact with a deposit within the trap device.

63. The trap device of claim 62, wherein the at least one deposit interaction element is configured to at least partially remove a deposit from a region within the trap device.

64. The trap device of claim 62, wherein the at least one deposit interaction element is configured to substantially maintain a continuous path through the trap device.

65. The trap device of claim 62, wherein the at least one deposit interaction element is configured to translate, rotate, or articulate.

66. The trap device of claim 62, wherein the at least one deposit interaction element includes an expandable element.

67. The trap device of claim 62, wherein the at least one deposit interaction element includes a machining tool comprising one of a drill bit, a milling bit, and a grinding implement.

68. The trap device of claim 62, wherein the at least one deposit interaction element includes a sharpened edge.

69. The trap device of claim 62, further comprising a measurement device configured to measure and communicate a signal indicating a characteristic of a deposit within the chamber.

70. The trap device of claim 69, further comprising a control device in communication with the measurement device signal configured to alter a physical interaction between the at least one deposit interaction element and the deposit in relation thereto in response to the measurement device signal.

71. The trap device of claim 70, wherein the at least one deposit interaction element is configured to physically contact a deposit exceeding a selected boundary within the trap device.

72. The trap device of claim 62, wherein the at least one deposit interaction element is configured to remove deposits from one region of the chamber and reposition the removed deposits within a selected storage region of the chamber.

73. A vacuum system, comprising:

a vacuum source;

a trap device for removing at least one undesirable constituent from a gaseous process stream passing through the vacuum system, the trap device having a chamber configured to operate at a pressure below atmospheric pressure; wherein the trap device includes at least one deposit interaction element for distributing or redistributing deposits comprising the at least one undesirable constituent within the chamber of the trap device.

74. The vacuum system of claim 73, wherein the at least one deposit interaction element is configured to cause at least a portion of the deposits to form a liquid or gas state within the chamber of the trap device.

75. The vacuum system of claim 73, wherein the at least one deposit interaction element is configured to cause at least a portion of the deposits to form a gaseous state within the chamber of the trap device.

76. The vacuum system of claim 73, wherein the at least one deposit interaction element is configured to facilitate formation of a deposit in at least one region of the chamber.

77. The vacuum system of claim 73, wherein the at least one deposit interaction element is configured to at least partially remove a deposit from at least a portion of the chamber.

78. The vacuum system of claim 73, wherein the at least one deposit interaction element is configured to at least partially preserve a substantially continuous path through the chamber.

79. The vacuum system of claim 73, wherein the at least one deposit interaction element is configured for inhibiting formation of deposits or removing deposits from along a substantially continuous path through the trap device.

80. The vacuum system of claim 79, wherein the at least one deposit interaction element comprises a laser beam-generating device for generating a laser beam positioned and sized for inhibiting formation of deposits or removing deposits from along the substantially continuous path through the trap device.

81. The vacuum system of claim 80, further comprising at least one of a mirror, a lens, and a beam splitter for communicating the laser beam along the substantially continuous path through the trap device.

82. The vacuum system of claim 73, wherein the at least one deposit interaction element comprises at least one thermal element for modifying a temperature of at least a portion of the chamber to influence formation of deposits therewithin.

83. The vacuum system of claim 82, wherein the at least one thermal element comprises at least one of a heat-generating element, a cooling element and a heat transfer element.

84. The vacuum system of claim 82, wherein the at least one thermal element comprises a thermoelectric device.

85. The vacuum system of claim 82, further comprising a measurement device configured to measure and communicate a signal indicating at least one of a temperature of the at least one thermal element and a characteristic of a deposit within the chamber.

86. The vacuum system of claim 85, further comprising a control device in communication with the measurement device signal configured to alter a response of the at least one thermal element in response thereto.

87. The vacuum system of claim 86, wherein the at least one thermal element comprises a plurality of thermal elements.

88. The vacuum system of claim 87, wherein each of the plurality of thermal elements is configured to modify a temperature of an adjacent portion of the chamber independently of at least one other thermal element of the plurality.

89. The vacuum system of claim 73, wherein the at least one deposit interaction element comprises at least one delivery port for delivering at least one substance within the chamber.

90. The vacuum system of claim 89, wherein the at least one delivery port is configured for modification of a temperature thereof.

91. The vacuum system of claim 89, wherein the at least one delivery port is configured to facilitate removal of deposits therefrom.

92. The vacuum system of claim 89, wherein the at least one delivery port is configured to deliver at least one substance comprising water or ammonia.

93. The vacuum system of claim 89, wherein the at least one delivery port is configured to cause formation of a deposit within the chamber.

94. The vacuum system of claim 89, wherein the at least one delivery port is configured to deliver at least one substance to cause formation of at least one precipitate within the chamber.

95. The vacuum system of claim 94, wherein the at least one precipitate includes at least one of titanium, titanium dioxide, hydrochloric acid, water and ammonium chloride.

96. The vacuum system of claim 89, wherein the at least one delivery port is configured to thermally facilitate formation of a deposit within the chamber.

97. The vacuum system of claim 89, wherein the at least one delivery port includes at least one nozzle or atomizer.

98. The vacuum system of claim 89, further comprising a control device for controlling the rate at which the at least one substance is delivered via the at least one delivery port.

99. The vacuum system of claim 98, wherein the control device comprises at least one valve.

100. The vacuum system of claim 89, further comprising a measurement device configured to measure and communicate a signal indicating at least one of a temperature within the chamber and at least one characteristic of a deposit within the chamber.

101. The vacuum system of claim 100, further comprising a control device in communication with the measurement device signal configured to alter the delivery of the at least one substance in response thereto.

102. The vacuum system of claim 100, wherein the at least one characteristic of the deposit is a thickness of the deposit.

103. The vacuum system of claim 89, wherein the at least one delivery port is configured to deliver more than one substance within the chamber.

104. The vacuum system of claim 89, wherein the at least one delivery port is configured to at least partially preserve a substantially continuous path through the deposits within the chamber.

105. The vacuum system of claim 89, wherein the at least one delivery port is configured for inhibiting formation of deposits or removing deposits from along a substantially continuous path through the chamber.

106. The vacuum system of claim 73, wherein the at least one deposit interaction element is configured to physically interact with a deposit within the trap device.

107. The vacuum system of claim 106, wherein the at least one deposit interaction element is configured to at least partially remove a deposit from a region within the trap device.

108. The vacuum system of claim 106, wherein the at least one deposit interaction element is configured to substantially maintain a continuous path through the trap device.

109. The vacuum system of claim 106, wherein the at least one deposit interaction element is configured to translate, rotate, or articulate.

110. The vacuum system of claim 106, wherein the at least one deposit interaction element is includes an expandable element.

111. The vacuum system of claim 106, wherein the at least one deposit interaction element includes a machining tool comprising one of a drill bit, a milling bit, and a grinding implement.

112. The vacuum system of claim 106, wherein the at least one deposit interaction element includes a sharpened edge.

113. The vacuum system of claim 106, further comprising a measurement device configured to measure and communicate a signal indicating a characteristic of a deposit within the chamber.

114. The vacuum system of claim 113, further comprising a control device in communication with the measurement device signal configured to alter a response of the at least one deposit interaction element in response thereto.

115. The vacuum system of claim 114, wherein the at least one deposit interaction element is configured to physically contact a deposit exceeding a selected boundary within the trap device.

116. The vacuum system of claim 106, wherein the at least one deposit interaction element is configured to remove deposits from one region of the chamber and reposition the removed deposits within a selected storage region of the chamber.

117. A method for forming deposits within a trap device having a chamber configured to remove at least one undesirable constituent from a gaseous process stream passing through a vacuum system comprising:

causing a pressure below atmospheric pressure within a chamber of the trap device; and

influencing distribution or redistribution of deposits comprising the at least one undesirable constituent within the chamber of the trap device during operation thereof.

118. The method of claim 117, wherein influencing the distribution of deposits within the trap device comprises promoting formation of the deposits within at least a region of chamber.

119. The method of claim 117, wherein influencing the distribution or redistribution of deposits within the trap device comprises inhibiting formation of the deposits within at least a region of the chamber.

120. The method of claim 117, further comprising measuring at least one of an operating condition of the trap device and a characteristic of a deposit within the chamber of the trap device.

121. The method of claim 117, wherein influencing the distribution or redistribution of deposits within the chamber of the trap device comprises introducing a substance within the chamber of the trap device.

122. The method of claim 121, wherein introducing the substance within the chamber comprises causing a chemical reaction between the at least one undesirable constituent within the gaseous process stream and the substance.

123. The method of claim 121, further comprising forming a precipitate within the gaseous process stream within the chamber of the trap device.

124. The method of claim 123, wherein forming a precipitate comprises forming a precipitate comprising at least one of titanium, titanium dioxide, hydrochloric acid, water, and ammonia chloride.

125. The method of claim 121, further comprising controlling a rate of introduction of the substance within the chamber.

126. The method of claim 121, wherein introducing a substance within the chamber of the trap device comprises introducing the substance within the chamber at more than one location.

127. The method of claim 121, further comprising altering the introduction of the substance in response to the measurement.

128. The method of claim 127, wherein altering the introduction of the substance in response to the measuring of at least one of an operating characteristic of the trap device and a characteristic of a deposit within the chamber comprises selecting at least one location to introduce the substance.

129. The method of claim 127, wherein altering the introduction of the substance in response to the measuring of at least one of an operating characteristic of the trap device and a characteristic of a deposit within the chamber comprises controlling rates at which the substance is introduced within the trap device at more than one location of introduction.

130. The method of claim 117, wherein influencing the distribution or redistribution of deposits within the chamber of the trap device comprises heating at least a region therein.

131. The method of claim 117, wherein influencing the distribution or redistribution of deposits within the chamber of the trap device comprises transferring heat therein.

132. The method of claim 117, wherein influencing the distribution or redistribution of deposits within the chamber of the trap device comprises removing heat therefrom.

133. The method of claim 117, wherein influencing the distribution or redistribution of deposits within the chamber of the trap device comprises altering a thermal environment in at least a portion thereof.

134. The method of claim 120, wherein influencing the distribution or redistribution of deposits within the trap device comprises altering a thermal environment within the chamber of the trap device in response to the measuring.

135. The method of claim 134, wherein altering the thermal environment within the chamber of the trap device in response to the measuring comprises selecting at least one region to within the chamber heat or cool.

136. The method of claim 135, wherein altering the thermal environment within the chamber of the trap device according to the measurement comprises heating or cooling different regions within the chamber of the trap device.

137. The method of claim 117, wherein influencing the distribution or redistribution of deposits within the chamber of the trap device comprises applying a force to a deposit therein.

138. The method of claim 117, wherein influencing the distribution or redistribution of deposits within the chamber of the trap device comprises physically manipulating a deposit therein.

139. The method of claim 117, wherein influencing the distribution or redistribution of deposits within the trap device comprises moving a deposit therein.

140. The method of claim 117, wherein influencing the distribution or redistribution of deposits within the trap device comprises machining a deposit therein.

141. The method of claim 117, wherein influencing the distribution or redistribution of deposits within the chamber of the trap device comprises accumulating deposits within at least one selected region therein.

142. The method of claim 117, wherein influencing the distribution or redistribution of deposits within the trap device comprises chemically inhibiting formation of deposits or removing depositsfrom along a substantially continuous path through the chamber of the trap device.

143. The method of claim 117, wherein influencing the distribution or redistribution of deposits within the trap device comprises thermally inhibiting formation of deposits or removing deposits from along a substantially continuous path through the chamber of the trap device.

144. The method of claim 117, wherein influencing the distribution or redistribution of deposits within the chamber of the trap device comprises removing deposits from a substantially continuous path therethrough at least once.

145. The method of claim 120, wherein influencing the distribution or redistribution of deposits within the chamber of the trap device comprises removing deposits along a substantially continuous path therethrough in relation to the measurement exceeding a predetermined value.

146. The method of claim 117, wherein influencing the distribution or redistribution of deposits within the chamber of the trap device comprises causing the chamber of the trap device to fill with deposits of constituents removed from the gaseous process stream passing therethrough in a substantially uniform manner therein.

147. The method of claim 120, wherein influencing the distribution or redistribution of deposits within the chamber of the trap device comprises causing the chamber of the trap device to fill with deposits of constituents removed from the gaseous process stream passing therethrough in a substantially uniform manner therein in response to the measuring.

148. The method of claim 120, wherein influencing the distribution or redistribution of deposits within the trap device comprises altering filling of deposits within the chamber of the trap device in response to the measuring.